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(54) Title: INFORMATION DISPLAY SCHEME FOR SUBSCRIBERS OF A SUBSCRIPTION TELEVISION SYSTEM

ACCOUNT STATUS

JOHN J. DOE		012-3456-789
PRIOR BALANCE		30. 00
YOUR PAYMENT/CREDIT		30. 00
AS OF 3/01/84		
SUBTOTAL		0. 00
MONTHLY CHARGES		20. 00
SPECIALS		12. 25
ACCOUNT BALANCE (PLEASE REMIT)		32. 25

TO DISPLAY SPECIALS VIEWED

PRESS UP-ARROW

(57) Abstract

An information display scheme for displaying subscriber unique information to subscribers of a subscription communications system. The system comprises template page receiving means coupled to the communications system for receiving a template page (A) as a format for the subscriber unique information (B), storage means coupled to the template page receiving means for storing the template page and logic means coupled to the communications system and to the storage means for locally generating and maintaining at least some of the subscriber unique information. The logic means combines the subscriber unique information with the template page for display to the subscriber.

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**INFORMATION DISPLAY SCHEME FOR
SUBSCRIBERS OF A SUBSCRIPTION TELEVISION SYSTEM**

BACKGROUND OF THE INVENTION

The present invention relates generally to the field of subscription communication systems and, more particularly, is directed to an information display scheme which simplifies the display of information to subscribers of a subscription communication system.

Subscription communications systems, such as television and special events programming, have gained wide spread acceptance as an efficient way of providing a vast selection of information and entertainment programming to the public. Such systems normally charge a fixed monthly service fee which entitles the subscriber to receive regular programming for the entire month. Many systems also provide a "movie channel" or a "special events channel" for an additional fee. Though a subscriber may wish to view only one or two movies or special events during the course of a month, he must nevertheless pay the full additional fee. Payment of a full fee where only a fraction of the service is utilized is uneconomical and often results in a majority of subscribers signing up to receive only regular programming. Thus other services are not sufficiently supported to provide quality programming.

A subscription television system should include provisions for a subscriber not only to select which channels he wishes to receive, but also to select which programs on a particular channel he wishes to view. In order to achieve maximum flexibility, the subscriber should also be permitted to make this selection at anytime without having to indicate to the broadcaster or system operator beforehand that he

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wishes to view a particular program. Ideally, the system should make all programming available to the subscriber and permit him to select and pay for only those programs that he actually views. This concept is often called "pay-per-program".

In a subscription television system having a pay-per-program feature, the system operator must be continuously informed of the programs selected for viewing by the subscriber for proper billing. Thus, such systems require an up-link or some form of communication from the subscriber to the system operator. Subscribers could, of course, maintain a log of all programs viewed and periodically send the log to the system operator for billing purposes. The integrity of such a billing procedure is suspect, however, and is impractical for a system having many subscribers. On-line feedback to the system operator of programs selected for viewing by the subscriber is also possible but such feedback provisions greatly complicate and increase the cost of the system.

In subscription television systems having a pay-per-program feature, the subscriber must also be kept apprised of his account status. Such information could be provided by a conventional teletext system where all the digital pulses which represent data are transmitted from the headend of the system on lines of the vertical blanking interval of the television signals. This data represents alphanumeric and graphical information which may be selectively displayed to the subscriber using a television receiver adapted for teletext reception. Typically, the subscriber requests a particular magazine page of information for display using a remote keypad interfaced to the teletext receiver. The receiver waits until the requested page is transmitted in the channel then captures the information in a page storage buffer. The contents of the buffer are displayed through a character generator onto the television screen.

In teletext systems known in the prior art, no significant modifications are made to the transmitted pages prior to their display

on the screen other than, perhaps, the addition of a page number in a fixed position on certain pages. In particular, conventional teletext systems do not provide for the addition of locally generated information by the receiver which might change the meaning or the interpretation of the transmitted information. Thus, information that is specifically directed to a particular subscriber, for example billing information, must always be completely generated at the headend or distributor end for down loading to the subscriber. This adds to the complexity of the system. Thus, in systems having a pay-per-program feature, means must still be provided for communicating to the system operator a listing of programs watched by the subscriber. Such a requirement further increases the complexity and cost of the system.

SUMMARY OF THE INVENTION

It is the overall object of the present invention to provide an information display scheme which simplifies the display of information to subscribers of a subscription communication system.

It is a specific object of the present invention to provide an information display scheme for subscribers of a subscription communication system which uses a template page transmitted from the headend of the system as a format for the display of locally generated information.

It is another specific object of the present invention to provide an information display scheme for subscribers of a subscription communication system which uses a template page transmitted from the headend of the system as a format for the display of locally generated customer unique information such as a billing summary at the subscriber's receiver.

It is a still further specific object of the present invention to provide an information display scheme for subscribers of a subscription communication system which uses a template page transmitted from the headend of the system as a format for the display of parameters associated with the status of the system.

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It is a further specific object of the present invention to provide an improved billing system for a subscription communication system which permits the subscriber to select and pay for only those programs that the subscriber actually views.

It is a still further object of the present invention to provide an improved billing system for a subscription communication system which permits the subscriber to select and pay for programs the subscriber wishes to view without having to communicate beforehand with the system operator.

It is another specific object of the present invention to provide an improved billing system for a subscription communication system which permits the subscriber to obtain on demand a summary of the subscriber's billing account information.

It is a still further specific object of the present invention to provide an information display scheme for subscribers of a subscription communication system which uses a template page transmitted from the headend of the system as a format for the display of locally generated information, the same template page being used for many subscribers.

The present invention has particular application in subscription television systems which transmit television programs in the form of scrambled signals to a decoder in the subscriber's home. A secure microprocessor within the decoder determines which signals are unscrambled for viewing dependent on the program selected by the subscriber and the status of the subscriber's account maintained by the microprocessor. The microprocessor is loaded with account data from the headend of the system which reflects service fees pre-paid by the subscriber. The cost of programs selected for viewing are automatically subtracted from the subscriber's account balance maintained by the microprocessor. Where the balance is insufficient to cover the cost of the program or exceeds an authorized credit limit, the microprocessor prevents the program from being descrambled. The

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subscriber's account balance may be increased by the subscriber sending to the system operator additional pre-paid service fees.

The billing account information maintained by the microprocessor is readily available for display to the subscriber and may be combined with a template page transmitted from the headend of the system over a convenient channel as a report format. For example, the template page may consist of nothing more than column headings for a billing summary.

Further objects, features and other aspects of the present invention will be understood from the detailed description of the preferred embodiment of the invention with reference to the annexed drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a subscription television decoder with a secure microprocessor in accordance with the present invention.

Figure 2 is a block diagram of a template page scheme as a format for displaying locally generated information in accordance with the present invention.

Figures 3, 4 and 5 are examples of displays of locally generated information on a template page in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to Figure 1, a block diagram is provided showing one example of a decoder for a subscription television system which includes a microprocessor for controlling the operation of the decoder as well as maintaining the subscriber's billing information. A further example of such a decoder is described in commonly assigned U.S. Patent Application Serial No. 507,565 entitled "Encryption and Decryption of Video Signals" filed June 24, 1983.

As shown in Figure 1, the MAC television signal first enters the multiplexer 300, which separates from it the luminance and chrominance signals as well as the audio, synchronization, timing and teletext information. The luminance signal is delivered to luminance

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store 302, a CCD line store, where it is decompressed, and then to low-pass filter 304, where it is filtered. The analog luminance signal then goes to output interface 306. The sampling signals necessary to decompress luminance are produced in timing generator 308 and supplied to luminance store 302 by two clock drivers 310.

The chrominance signal from demultiplexer 300 is also decompressed in chrominance store 312, which is also a CCD line store. Separate outputs are provided for the two color difference signals, which are filtered in two low-pass filters 314 and then supplied to output interface 306. The necessary sampling signals are supplied to chrominance store 312 from timing generator 308 through three clock drivers 310.

Signals not constituting luminance or chrominance are also separated from the MAC television signal by demultiplexer 300. These signals include audio, teletext and synchronization and timing information. Audio, teletext, and synchronization signals are delivered to demultiplexer 316 through one of two low-pass filters 318; while the fixed-frequency timing information is delivered to demultiplexer 316 through band-pass filter 320. Demultiplexer 316 separates these signals, supplying the audio to audio demultiplexer 322 and the synchronization and timing signals to clock and synchronization recovery circuit 324 and timing generator 308. Audio information from demultiplexer 316 is separated into four channels in audio demultiplexer 322 and output by analog audio processor 326. Teletext information is sent to character generator 328 via clock and synchronization recovery circuitry 324. Decoder operations are under the control of microprocessor 330, which communicates with clock and synchronization recovery circuit 324, teletext character generator 328, and RAM 332 over bidirectional buses 334, 336, and 338.

Output interface 306 receives teletext characters from character generator 326, luminance from low-pass filter 304, chrominance from low-pass filters 314, and timing signals from timing generator 308. Its output is a standard NTSC color television signal.

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Figure 2 is a block diagram of the template page scheme in accordance with the present invention. As shown, microprocessor 360 can be used to replace microprocessor 330 shown in Figure 1 to also control the operations of a decoder. Block 350 of Figure 2 is a data recovery unit which recovers information data and template page data from a data channel in the decoder, as for example the decoder shown in Figure 1. The recovered data from data recovery unit 350 is supplied to page selection unit 351 which selects data for storage in page buffer 352. Microprocessor 360 is coupled to page selection unit 351 and page buffer 352 to also control the selection of data for storage in page buffer 352. Keypad interface 354 is coupled to microprocessor 360 for interfacing a keypad, or other device operable by the subscriber, to control the operation of the microprocessor and to indicate to the microprocessor such information as which programs the subscriber wishes to view. Microprocessor 360 is also coupled to character generator 328, also shown in Figure 1, which processes information from page buffer 352 and microprocessor 360 for display on the television screen via output interface 306 shown in Figure 1 as well. Output interface 306 may be controlled to select for output to the television screen normal television video signals or textual video signals from character generator 328.

In a subscription television system having a pay-per-program feature in accordance with the present invention, the subscriber mails in to, or otherwise deposits with, the operator of the system an amount of money equal to the fixed monthly service fee plus an additional amount to be held in reserve for the subscriber which he may draw against to view special programs not included in regular programming under the fixed monthly fee. The operator then transmits signals over the channel to the particular subscriber which indicates how much money was received from the subscriber. This information is stored in secure microprocessor 360. Microprocessor 360 includes account balance means for maintaining the subscriber's account balance which is

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updated by the payment information received from the system operator. The microprocessor also includes means for determining the cost of programs available for viewing by the subscriber.

This cost information may also be transmitted by the system operator to the microprocessor and stored therein.

The cost of programs selected for viewing by the subscriber are automatically subtracted from the subscriber's balance maintained by the microprocessor. When the balance is insufficient to cover the cost of the program, or exceeds a predetermined credit limit, the microprocessor prevents the program transmitted over the channel from being descrambled. Microprocessor 360 also sets an internal flag associated with each program selected for viewing. The subscriber's account balance may be increased by the subscriber pre-paying additional service fees.

Figures 4-5 illustrate various reports or page displays that the subscriber may command microprocessor 360 via keypad interface 354 to display on the television screen. Figure 4 illustrates a display showing the subscriber's billing account status. In this example, the display comprises Part A enclosed in a box and Part B. The box is drawn around Part A to set it apart from Part B for purposes of explanation. Note that the information contained in Part B is descriptive information or headings and is the same for each subscriber. Part B thus serves as a template or heading for the information unique to each subscriber contained in Part A. Since Part B is the same for many subscribers, it may be efficiently transmitted over a teletext or other channel in the system to these subscribers at the same time. The information contained in Part A on the other hand, is unique to each subscriber and may be more efficiently generated and maintained by microprocessor 360 coupled to the decoder in each subscriber's home.

Figure 5 illustrates a display showing a system control page indicating the status of various parameters associated with the decoder.

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Here again, the display is divided into Parts A and B for purposes of explanation. As described above with respect to Figure 4, Part B, is descriptive information serving as a template or format for the information contained in Part A and is the same for many subscribers. The information in Part A is provided by microprocessor 360.

Figure 5 is a further example of a display in accordance with the present invention similarly divided into Parts A and B as above described. This display lists the number of special programs viewed and their costs. In order to generate this display, the template page includes a listing of all programs made available to the subscriber and their costs. As the list is received by microprocessor 360, it determines which programs do not have a corresponding internal flag set indicating that those programs were not selected for viewing by the subscriber. The cost figure for these programs is overprinted in the display with "****" indicating that the programs were not purchased.

As Figures 4-5 illustrate, the information display system in accordance with the present invention effectively utilizes a template or format scheme to display information not unique to a specific subscriber. Because this type of information is the same for many subscribers, rather than being generated locally for each subscriber, it can be transmitted to everyone at the same time from the main distribution point for the system. The information that is unique to each subscriber, however, is more efficiently generated and maintained by the microprocessor coupled to the decoder in each subscriber's home. Thus, the present invention avoids having to send subscriber unique information from the headend of the system for each subscriber. In a large system, e.g., in a system using a satellite to reach millions of subscribers, the benefits of not having to provide from the headend all subscriber unique information are substantial.

The information display system of the present invention overcomes the above noted deficiencies in subscription television

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systems known in the prior art which have a pay-per-program feature. In conventional systems, it is necessary that an up link, e.g., by telephone, or some other form of feedback communication be provided from the subscriber to the system operator so that the subscriber is correctly billed for the programs viewed. In the system of the present invention, no feedback to the system operator of any kind is required. The system always operates in a download mode. Thus, the system is less complicated and easier to maintain. Moreover, because the microprocessor coupled to the decoder in the subscriber's home does all of the housekeeping functions with respect to which programs are selected for viewing and automatically subtracts the cost of the programs from the subscriber's account balance, the system is less burdened and can be more fully utilized to provide additional programming. The system of the present invention also permits the status of the decoder to be continuously monitored and displayed to the subscriber.

The present invention has been described in detail in connection with a preferred embodiment. The embodiment, however, is merely an example and the invention is not restricted thereto. It will be understood by those skilled in the art from a reading of the specification that variations and modifications can be made within the scope of the present invention as defined by the appended claims.

CLAIMS

1. An information display system for displaying subscriber unique information to subscribers of a subscription communications system, the information display system comprising:

display means coupled to the communications system for displaying information received from the communications system;

template page receiving means coupled to the communications system for receiving a template page as a format for the subscriber unique information;

storage means coupled to the template page receiving means for storing the template page;

logic means coupled to the communications system, the display means and to the storage means for locally generating and maintaining at least some of the subscriber unique information, said logic means combining the subscriber unique information with the template page for display on said displays means.

2. The information display system of claim 1 wherein said logic means is a microprocessor.

3. The information display system of claim 1 wherein the subscriber unique information includes billing information for the subscriber.

4. The information display system of claim 1 wherein the subscriber unique information includes system status information.

5. The information display system of claim 1 wherein the template page is transmitted over a teletext channel of the communications system.

6. In a subscription television system having means for transmitting a scrambled video signal representing television programs to a descrambling decoder and television receiving means for receiving a descrambled signal from the decoder, an information display system for displaying subscriber unique information on said television receiving means, said display system comprising:

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template page receiving means coupled to said decoder for receiving a template page as a format for the subscriber unique information;

storage means coupled to said template page receiving means for the storing to said template page;

logic means coupled to the decoder and to said storage means for generating at least some of the subscriber unique information, said logic means combining the subscriber unique information with said template page for display on said television receiving means.

7. The information display system of claim 6 further including input means coupled to said logic means for selecting television programs for viewing by the subscriber, said logic means includes means for storing a log of selected programs.

8. The information display system of claim 7 wherein said logic means compares each entry of said log with said template page and displays said subscriber unique information depending on the result of the comparison, said subscriber unique information indicating which programs were selected by the subscriber.

9. The information display system of claim 6 wherein said logic means includes

account balance means for maintaining an account balance and receiving a payment signal representing a payment made by the subscriber;

program selection means for receiving a program signal representing a program selected for viewing by the subscriber;

cost means coupled to said program selection means for providing a cost signal representing the cost of the program selected by the subscriber;

arithmetic means coupled to said account balance means and said cost means for subtracting said cost signal from said account balance and for adding said payment signal to said account balance;

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comparison means coupled to said account balance means for providing a comparison signal when said account balance is below a predetermined value; and

inhibitor means responsive to said comparison signal for inhibiting descrambling when the comparison signal is present.

10. The information display system of claim 7 wherein said logic means includes means for generating billing information for the subscriber dependent on the programs selected for viewing, wherein said subscriber unique information includes said billing information.

11. A method of displaying subscriber unique information to subscribers of a subscription communications system, the method comprising the steps of:

locally generating at least some of the subscriber unique information;

providing a template page from the communications system as a format for the subscriber unique information;

temporarily storing said template page; and

combining the subscriber unique information with said template page for display to the subscriber.

12. The method of claim 11 wherein said step of locally generating at least some of the subscriber unique information includes the step of locally generating billing information for the subscriber.

13. The method of claim 11 wherein said step of locally generating at least some of the subscriber unique information includes the step of locally generating system status information.

14. The method of claim 12 wherein said step of locally generating billing information for the subscriber includes the steps of

maintaining an account balance for the subscriber;

subtracting from said account balance the cost of programs selected for viewing by the subscriber; and

adding to said account balance payments made by the subscriber.

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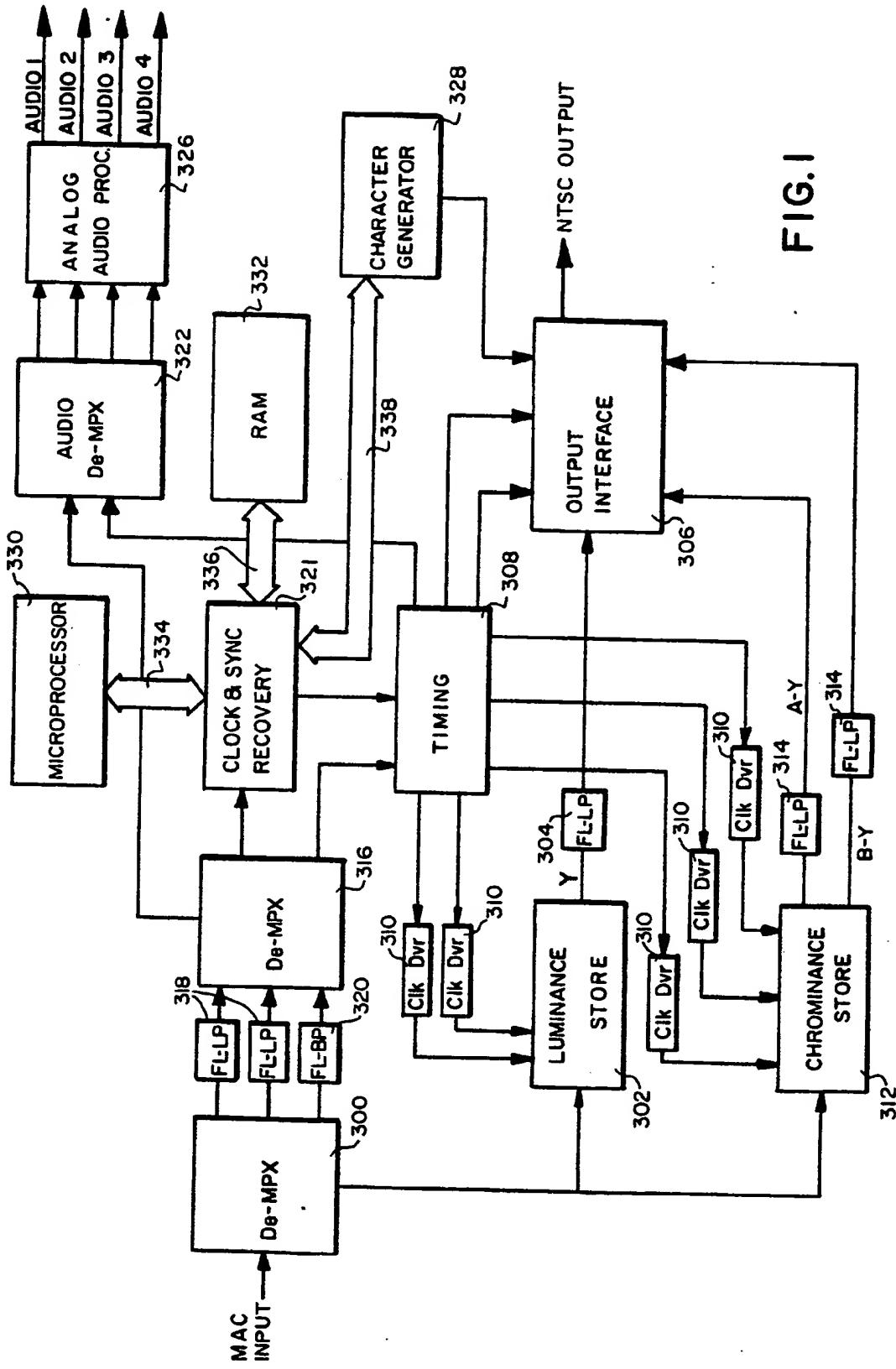


FIG. I

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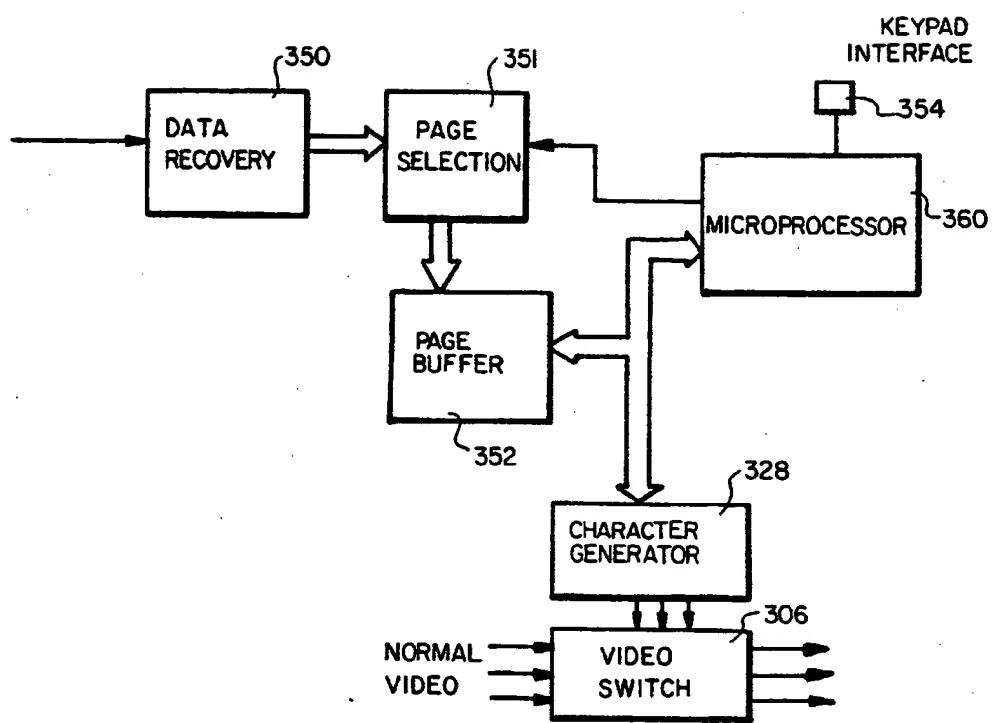


FIG.2

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ACCOUNT STATUS

JOHN J. DOE	012-3456-789
PRIOR BALANCE	30.00
YOUR PAYMENT/CREDIT	30.00
AS OF 3/01/84	
SUBTOTAL	0.00
MONTHLY CHARGES	
SPECIALS	
ACCOUNT BALANCE (PLEASE REMIT)	32.25

B

A

TO DISPLAY SPECIALS VIEWED
PRESS UP-ARROW

FIG. 3

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CONTROL PAGE

- YOUR PARENTAL CONTROL IS SET AT **[2]**
YOUR BUY BUTTON IS **LOCKED** •
PRESS UP ARROW FOR PIN CHANGE
- A
- B { TO CHANGE RESTRICTIONS
PRESS NUMERAL (S) BELOW:
- Ø - UNRESTRICTED
 - 1 - NO R RATED OR ABOVE
 - 2 - NO PG RATED OR ABOVE
 - 8 - LOCK BUY BUTTON
 - 9 - UNLOCK BUY BUTTON

FIG. 4

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B
SPECIALS VIEWED

DATE	TITLE	COST
03/7	TERMS OF ENDEARMENT	\$4.00
03/7	BOSTON SYMPHONY	\$3.25
03/6	E.T.	\$4.50
03/6	THE GREAT WAR #3	**** A
03/6	FISHIN MUSICIAN	\$0.50
03/6	THE GREAT WAR #2	**** A

**** PROGRAM NOT PURCHASED
FOR MORE PRESS UP-ARROW

FIG.5

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 85/01721

L. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC⁴: H 04 N 7/16

II. FIELDS SEARCHED

Minimum Documentation Searched ?

Classification System	Classification Symbols
IPC ⁴	H 04 N 7/00; G 09 G 1/00; G 07 F 7/00

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched *

III. DOCUMENTS CONSIDERED TO BE RELEVANT*

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages ***	Relevant to Claim No. ****
P,A	EP, A3, 0128555 (TOCOM, INC.) 19 December 1984, see page 4, line 2 - page 9, line 35; page 11, lines 7-22 --	1-3,5-7,9- 12,14
P,A	EP, A2, 0149746 (WYSE TECHNOLOGY) 31 July 1985, see page 4, lines 14-20; page 4, line 30 - page 5, line 15 --	1,2,11
A	US, E, 30773 (GLASER et al.) 13 October 1981, see column 5, lines 11-18; column 5, line 1,11 55 - column 6, line 8; column 6, lines 45-51; figures 7B and 8D --	1,11
A	US, A, 3728480 (BAER) 17 April 1973, see column 3, line 56 - column 4, line 3; column 4, line 55 - column 5, line 10, column 10, lines 17-55 -----	1,6,11

* Special categories of cited documents: 10

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"Z" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search

19th December 1985

Date of Mailing of this International Search Report

30 JAN. 1986

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

G.L.M. Rydenberg

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/US 85/01721 (SA 10663)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 21/01/86

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A- 0128555	19/12/84	JP-A- 60024791	07/02/85
EP-A- 0149746	31/07/85	None	
US-E- 30773	13/10/81	FR-A, B DE-A- 2815591 BE-A- 866397 US-A- 4134537 JP-A- 54000547 AU-A- 3417878 GB-A- 1573466 AU-B- 511191 CA-A- 1101997 CH-A- 631280	24/11/78 02/11/78 26/10/78 16/01/79 05/01/79 20/09/79 20/08/80 31/07/80 26/05/81 30/07/82
US-A- 3728480	17/04/73	None	